

## Turbo 2 ultrafast high voltage rectifier

**Table 1. Main product characteristics**

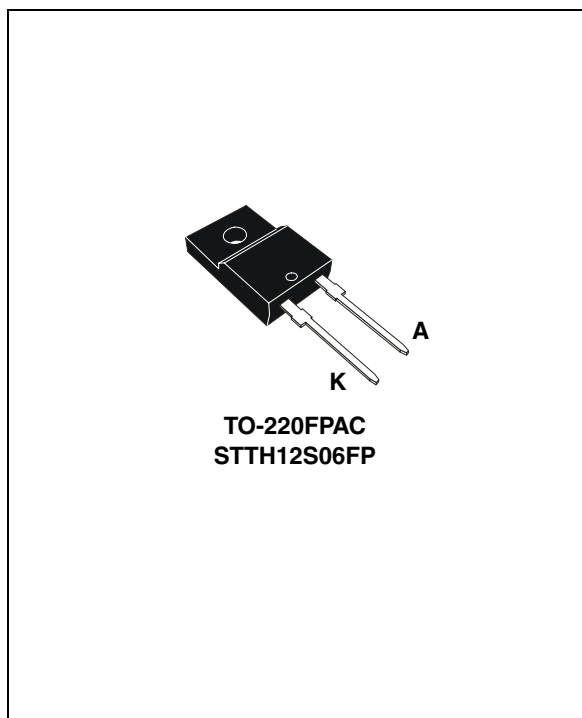
$I_{F(AV)}$	12 A
$V_{RRM}$	600 V
$I_{RM} (typ.)$	6 A
$T_j (max)$	175 °C
$V_F (typ)$	1.5 V
$t_{rr} (typ)$	14 ns

### Features and benefits

- Ultrafast recovery
- Low reverse recovery current
- Reduces losses in diode and switching transistor
- Low thermal resistance
- Higher frequency operation
- Insulated voltage: 1500 V<sub>RMS</sub>

### Description

ST's STTH12S06 is a state of the art Ultrafast recovery diode. By the use of 600 V Pt doping Planar technology, this diode will outperform the power factor correction circuits operating in hardswitching conditions. The extremely low reverse recovery current of the STTH12S06, reduces significantly the switching power losses of the MOSFET, and thus increases the



efficiency of the application. This allows designers to reduce the size of their heatsinks.

This device is also intended for applications in power supplies and power conversions systems, and other power switching applications.

**Table 2. Absolute ratings (limiting values at 125 °C, unless otherwise stated)**

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage		600	V
$I_{F(AV)}$	Average forward current		12	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10$ ms sinusoidal	100	A
$T_{stg}$	Storage temperature range		- 65 + 175	°C
$T_j$	Maximum operating junction temperature		175	°C

# 1 Characteristics

**Table 3. Thermal resistances**

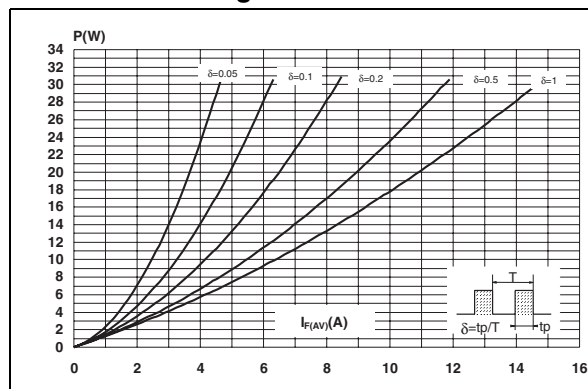
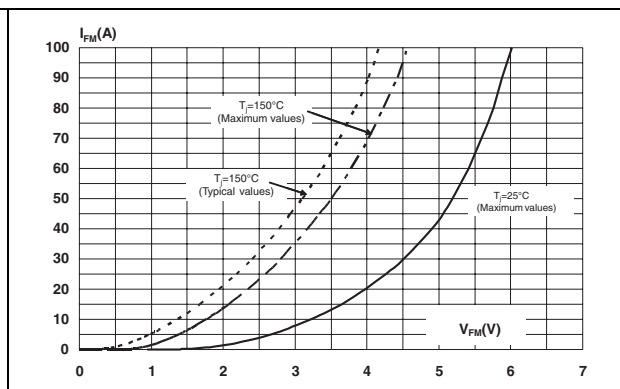
Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	4.6	$^{\circ}\text{C/W}$

**Table 4. Static electrical characteristics**

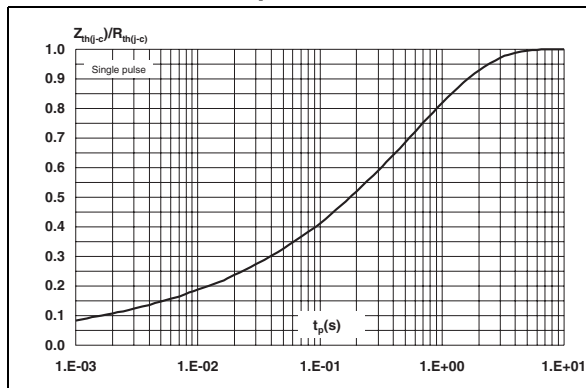
Symbol	Parameter	Tests conditions	Min.	Typ.	Max.	Unit
$I_R$	Reverse leakage current	$V_R = 600\text{ V}$	$T_j = 25\text{ }^{\circ}\text{C}$		30	$\mu\text{A}$
			$T_j = 125\text{ }^{\circ}\text{C}$	35	400	
$V_F$	Forward voltage drop	$I_F = 12\text{ A}$	$T_j = 25\text{ }^{\circ}\text{C}$		3.4	V
			$T_j = 150\text{ }^{\circ}\text{C}$	1.5	1.9	

**Table 5. Dynamic electrical characteristics**

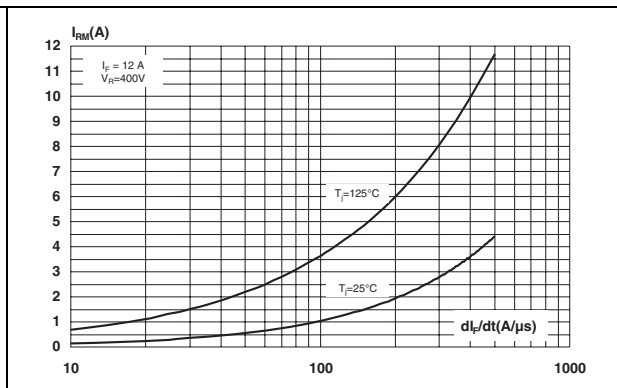
Symbol	Tests conditions	Min.	Typ.	Max.	Unit
$t_{rr}$	$I_F = 1\text{ A}$ $di_F/dt = -200\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$		14	21	ns
$I_{RM}$	$V_R = 400\text{ V}$ $I_F = 12\text{ A}$ $di_F/dt = -200\text{ A}/\mu\text{s}$	$T_j = 125\text{ }^{\circ}\text{C}$	6.0	8.0	A
S factor	$V_R = 200\text{ V}$ $I_F = 12\text{ A}$		0.3		
$Q_{rr}$	$di_F/dt = -200\text{ A}/\mu\text{s}$		160		nC

**Figure 1. Conduction losses versus average current**

**Figure 2. Forward voltage drop versus forward current**


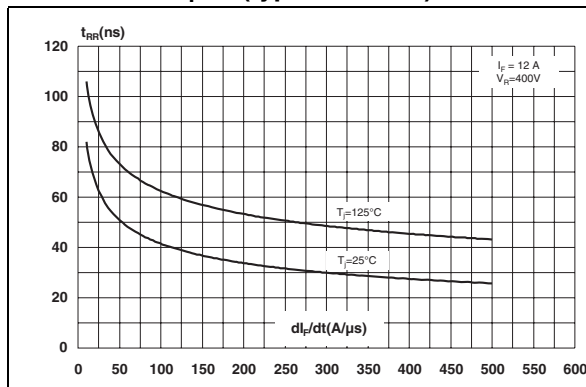
**Figure 3. Relative variation of thermal impedance, junction to case, versus pulse duration**



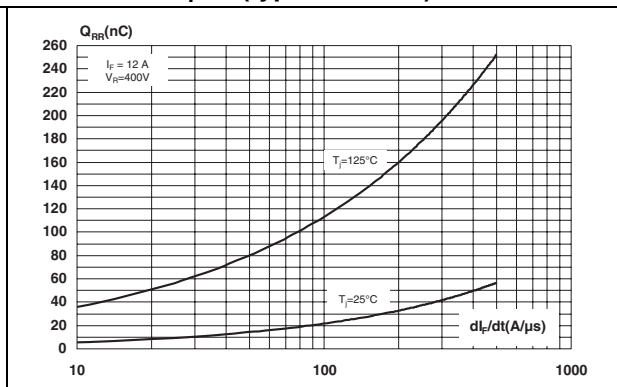
**Figure 4. Peak reverse recovery current versus  $di_F/dt$  (typical values)**



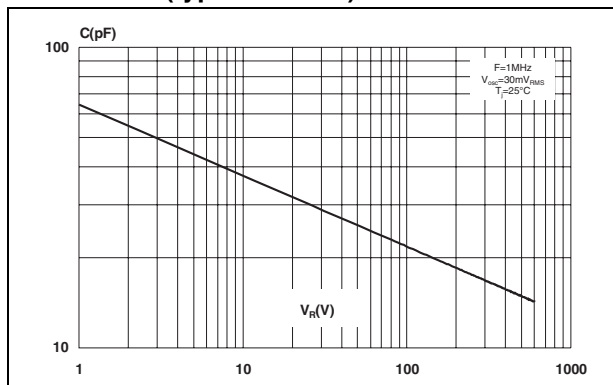
**Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)**



**Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)**



**Figure 7. Junction capacitance versus reverse voltage applied (typical values)**



## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 Nm
- Maximum torque value: 0.7 Nm

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com).

**Table 6. TO-220FPAC dimensions**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

### 3 Ordering information

Table 7. Ordering information

Part number	Marking	Package	Weight	Base qty	Delivery mode
STTH12S06FP	STTH12S06FP	TO-220FPAC	1.64	50	Tube

### 4 Revision history

Table 8. Revision history

Date	Revision	Changes
02-Oct-2007	1	Initial release.

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